

NUTRIENT MANAGEMENT PLAN SUPPLEMENTAL INFORMATION

N.C. Practice Job Sheet: NC-590

Prepared for: _____

By: _____

Farm: _____ Tract(s): _____ Date: ____/____/____

WHAT IS NUTRIENT MANAGEMENT?

Nutrient Management is applying nutrients from all sources with the right placement, in the right amount, at the right time, and from the right source to minimize nutrient losses to surface and groundwater. This practice is accomplished through development and implementation of a Nutrient Management Plan, which can be part of a broader Conservation Plan or CNMP that addresses multiple resource concerns.

PURPOSE OF NUTRIENT MANAGEMENT

A nutrient management plan is intended to accomplish one or more of the following objectives:

- To budget, supply, and conserve nutrients for plant production.
- To minimize agricultural nonpoint source pollution of surface and groundwater resources.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical, and biological condition of soil.

CONTENTS OF THE NUTRIENT MANAGEMENT PLAN

The following components are included in nutrient management plan specifications typical of more ‘traditional’

fertilizer and manure application methods. When precision ag/variable rate application technology is utilized, see the next section of this Job Sheet for additional guidance on plan requirements.

- aerial site photograph(s)/imagery or site map(s), and a soil survey map of the site,
- Sufficient soils information—such as dominant soil map until for each planned field—needed to apply nutrients at RYE and Soil Test Report determined rates as appropriate; and to not exceed rates determined by nutrient risk assessment planning criteria.
- location of designated sensitive areas and the associated nutrient application restrictions and setbacks,
- results of approved risk assessment tools for any necessary evaluations for nitrogen, phosphorus, and erosion losses.
- current and/or planned plant production sequence or rotation,
- soil, water, compost, manure, organic by-product, and plant tissue sample analyses applicable to the plan. Where non-NCDA soil testing labs are used, nutrient recommendations must be made using NCDA-similar guidelines and methodologies. Note: high levels of soil copper and zinc may be toxic to production crops. Land application of these nutrients must be accordance with NCSU/NCDA crop toxicity guidelines.
- Realistic yield goals for the crops planned for nutrient application,

- Planned nitrogen application rates based on NC Realistic Yield Expectations (RYEs) or sufficiently documented yield records,
- The Nitrogen Leaching Index for planned fields,
- Planned P & K application rates based on soil test results (see next section where P & K applied through variable rate technology).
- listing and quantification of all nutrient sources and form, including starter fertilizer applications and legume-based cover crop mixes.
- in accordance with the nitrogen and phosphorus risk assessment tool(s), specify the recommended nutrient application source, timing, amount (except for precision/variable rate applications specify method used to determine rate), and placement of plant nutrients for each field or management unit, and
- guidance for implementation, operation and maintenance, and recordkeeping as specified by the CNMP or applicable NC DWQ or NDPES permit.

Where precision/variable rate nutrient application applications are planned and made, some required planning components of the preceding section may be provided by the overall conservation plan. In addition, the following components are required in nutrient management planning.

- The geo-referenced field boundary and data collected that was processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations.
- Planned nitrogen application rates based on NC RYEs or sufficiently documented yield records
- The Nitrogen Leaching Index for planned fields.
- The nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.
- Soil testing documentation that crop Phosphorus (P₂O₅) and Potassium (K₂O) nutrient or soil amendment application will be made per soil test results similar to NCDA guidelines. Where P & K will not be applied via variable rate application technology, but by basic GPS guidance, recommended P & K

rates must be provided as specifications prior to application.

- Note—where Diammonium phosphate (18-46-0) is the primary variable rate P fertilizer source applied on legume crops, additional N will likely be needed to achieve RYEs.

The plan was developed based on the current NRCS 590 standard and Federal, state, or local regulations or policies. Changes in laws or regulations may require a plan modification. This Job Sheet is a required supplement to the Nutrient Management Plan.

NC Permitted Animal Operations: For NC DENR-DWR or NPDES permitted animal operations, the waste utilization portion of the Certified Animal Waste Management Plan (CAWMP) must meet requirements specified by the Permit. The NC 1217 Interagency Group provides guidance on the required minimum elements of a CAWMP. This guidance is found in Sec 1.1 of the latest 1217 Guidance Document, located at: <http://www.ncagr.gov/SWC/tech/guidancedocuments.html>.

Nitrogen Leaching Index Values

Nitrogen Leaching Index values, obtained through use of current Soil Hydrologic Group (SHG)-based LI index maps in Sec II of the NC FOTG or RUSLE 2 field-specific soil loss calculations, are included in the Nutrient Management Plan. SHGs per soil map unit are available through selection of the Soil Data Explorer and Soil Properties and Qualities (then select "Soil Qualities and Features") tabs once an Area of Interest has been defined in NRCS Web Soil Survey.

If the Nitrogen Leaching Index > 10 for planned fields, appropriate conservation practices must be included in a conservation plan to prevent nitrogen from leaving the field via surface or subsurface runoff.

Below are conservation crop management techniques and practices recommended for mitigation of nitrate losses (practices also documented in conservation plan):

NUTRIENT MANAGEMENT PLAN DEVELOPMENT

The nutrient management plan has been developed to meet nutrient application rate criteria for all sources of nitrogen, phosphorus, potassium as specified by NRCS 590 Nutrient Management standard criteria.

In addition to NCDA Agronomic Division soil test recommendations, or soil test recommendations made through similar guidelines, the plan is based on NC INMC approved values for realistic yield goals, nitrogen factors, phosphorus removal rates, default nutrient values for animal waste, plant availability coefficients for N, P, and K, and animal waste generation volumes where applicable.

Approved values are found at:

<http://nutrients.soil.ncsu.edu/index.htm>

Where manure is applied, farm records may also be used through a procedure provided in SB 1217 Interagency Group guidance, available at:

<http://www.ncagr.gov/SWC/tech/1217committee.html>

For NC permitted animal operations, planning requirements for Plan "Amendments" (minor modifications) and "Revisions" (Major Modifications) are clarified by SB 1217 Interagency Group Guidance.

ADDITIONAL PHOSPHORUS-RELATED PLAN INFORMATION (Applicable when increases in Soil Test P are expected on the planned area)

In NC, a field-specific Phosphorus Loss Assessment Tool (PLAT) evaluation is completed in accordance with 590 Nutrient Management standard General Criteria requirements, and phosphorus must be applied in accordance with 590 standard Manure Phosphorus Application Rates.

In addition to the basic plan components, plan information on PLAT categorical ratings, P drawdown strategies, and conservation practices to reduce P loss risk is required when **increases in Soil Test P are expected on the planned area**.

Typically, this could occur when manure is consistently applied at Nitrogen-based rates. High levels of phosphorus in the surface soil layer have been linked to increasing risk of P loss through surface runoff and leaching.

- Increases in Soil Test P are expected on the planned area (not typical if P application made per soil test results).***

PLAT Categorical Ratings Information

When soil test phosphorus continues to increase on a long term basis, PLAT may produce results that require P-based manure application planning and planning for no additional manure P. Conditions that will require P-based or no-P planning will be based on site specific resource conditions, which will facilitate data input into PLAT. PLAT categorical ratings that will require enhanced P application planning are:

HIGH: P-based manure application is required (limited to P uptake in harvested crop biomass)

VERY HIGH: No additional manure P or starter P application to be specified in nutrient management plan.

Phosphorus Drawdown Strategy Information:

Implementation of a phosphorus 'drawdown' strategy may be a consequence of PLAT results, or may be requested in order to lower soil test phosphorus levels.

Should a reduction in soil test P be desired or necessary, the only currently proven method of substantial P 'drawdown' is to not apply manure-based P and to plant and harvest crops that utilize P currently present in the soil surface.

Crop specific estimated annual P removal amounts are available on the NCSU Nutrient Management in NC website:

<http://nutrients.soil.ncsu.edu/yields/index.php>

Conservation Practices and Management Techniques to Reduce P Loss Potential:

Conservation practices, especially those that prevent soil particle detachment and trap sediment at field edges are effective in preventing phosphorus movement from the planned site. Manure application techniques can also be applied to reduce P loss risk. These practices must be included in the conservation plan where determined PLAT risk = HIGH for planned fields.

Consult the conservation plan developed in conjunction with the nutrient management plan for information on practices recommended to reduce phosphorus AND nitrogen loss risks. Application management techniques to reduce nutrient loss risk may be prescribed below:

Long Term Strategy for Reduction of Soil P Levels:

As noted in the P drawdown strategy section, the only currently proven method for reducing high levels of soil P is not applying P, paired with producing crops on the planned site that use existing soil P. Where soil P and PLAT evaluations indicate an increasing risk to water quality, substantially reducing soil P levels through crop uptake can take many years of implementation. When P is not applied, and existing soil P is used by crops, eventually, soil will become P deficient. Consult CES or NCDA Regional Agronomy specialists for additional information soil test P reduction timelines.

Manure P produced in excess of crop requirements:

Consult the nutrient management plan for a quantification of manure generated by the animal feeding operation that may exceed crop P requirements.

“Manure Hauler” Information

All manure waste applied on land owned by or controlled by the Animal Feeding Operation (AFO) owner or operator must be included in the nutrient management plan. The volume difference in total manure waste generated by the AFO and waste applied to land not owned or controlled by the producer must be accounted for in a nutrient management plan.

General information on manure waste generated by an AFO to be applied to land not owned or controlled by the AFO owner or operator may be recorded as specified in the *NC CNMP Certification Sheet and Documentation Checklist* or other supplemental documentation to the nutrient management plan. NRCS CNMP technical criteria require documentation of manure exports off the farm (this can be done below). The AFO owner/operator should provide the third party applicator with a current waste analysis in order to facilitate agronomic crop application of the facility's generated waste. Should land not owned or controlled by the AFO owner or operator be included in a nutrient management plan, the complete plan must meet 590 criteria.

Type and Quantity of Animal Feeding Operation (AFO) manure generated by the facility:

Quantity of AFO manure generated to be exported off the farm for third party application:

RECORDKEEPING

Waste reports from the NCDA & CS Agronomic Division, or equivalent, are acceptable sources of information for determining applied manure nutrient amounts for recordkeeping or crop budgeting purposes.

Records must be maintained for at least 5 years, or for time and manner required by Permit for animal operations to document plan implementation and maintenance. As applicable, records include:

- soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,
- quantities, analyses and sources of nutrients applied,
- dates, and method(s) of nutrient applications, source of nutrients, and rates of application,
- weather conditions and soil moisture at the time of application; lapsed time to manure incorporation; rainfall or irrigation event,
- crops planted, planting and harvest dates, yields, nutrient analyses of harvested biomass, and crop residues removed,
- dates of plan review, name of reviewer, and recommended changes resulting from the review, and
- all enhanced efficiency fertilizer products used.

Additional records for precision/variable rate sites must include:

- maps identifying the variable application source, timing, amount, and placement of all plant nutrients applied, and
- GPS-based yield maps for crops where yields can be digitally collected.
- Documentation per field nitrogen application rates do not exceed RYE-based recommended rates
- Documentation that applied phosphorus and potassium recommendations do not exceed recommended rates specified by soil tests.
- For non-variable rate application of P & K, provide applied map with field boundaries indicating source, timing, method, and rate of all applications.
- Where 'chlorophyll reader' technology is utilized, application records that nitrogen rates match RYE-based N rates as closely as possible.

OPERATION AND MAINTENANCE

The producer is responsible for safe operation and maintenance of this practice, including all equipment. Review the plan periodically to determine if adjustments or modifications to the plan are needed. In NC, animal operations permitting provisions may specify more frequent review periods. Adhere to the following operation and maintenance provisions:

- Protect fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
- Properly calibrate application equipment to ensure uniform distribution of material at planned rates.
- Workers should be protected from and avoid unnecessary contact with inorganic fertilizers and organic by-products. Extra caution must be taken when handling ammonia sources of nutrients, or when dealing with organic wastes stored in unventilated enclosures.
- The disposal of material generated by the cleaning of nutrient application equipment should be accomplished properly. Excess material should be collected and stored or field applied in an appropriate manner. Excess material should not be applied on areas of high potential risk for runoff or leaching.
- Disposal or recycling of nutrient containers should be done according to state and local guidelines or regulations.